

# Jared F. Miller

CONVEX OPTIMIZATION · NONLINEAR SYSTEMS · CONTROL

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## Education

### Northeastern University

Boston, MA, USA

#### PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING

Sept. 2018 - Present

- Communications, Control, and Signal Processing (CCSP)
- Advised by Prof. Mario Sznaiier
- Thesis Title: “Safety Analysis for Nonlinear and Time-Delay Systems using Occupation Measures”
- Thesis Committee: Mario Sznaiier, Octavia Camps, Bahram Shafai, Eduardo Sontag, Didier Henrion (LAAS-CNRS)
- GPA: 4.0 (4.0 Scale)
- Expected Graduation May 2023

#### M.S. IN ELECTRICAL AND COMPUTER ENGINEERING

Sept. 2015 - May 2018

- Communications, Control, and Signal Processing (CCSP)
- GPA: 3.852 (4.0 Scale)

#### B.S. IN ELECTRICAL ENGINEERING

Sept. 2013 - May 2018

- Minor in Mathematics
- GPA: 3.865 (4.0 Scale), summa cum laude

## Research Publications

### Journal Papers (published)

1. Jared Miller and Mario Sznaiier. Data-Driven Gain Scheduling Control of Linear Parameter-Varying Systems using Quadratic Matrix Inequalities. *IEEE Control Systems Letters*, 2022. [link] (LCSS-ACC)
2. Jared Miller, Yang Zheng, Mario Sznaiier, and Antonis Papachristodoulou. Decomposed structured subsets for semidefinite and sum-of-squares optimization. *Automatica*, 137:110–125, 2022. [link]
3. J. Miller, D. Henrion, and M. Sznaiier. Peak Estimation Recovery and Safety Analysis. *IEEE Control Systems Letters*, 5(6):1982–1987, 2021. [link] (LCSS-ACC)
4. Jared Miller, Muhammad Ali Al-Radhawi, and Eduardo Daniel Sontag. Mediating Ribosomal Competition by Splitting Pools. *IEEE Control Systems Letters*, 5(5):1555–1560, 2021. [link] (LCSS-ACC)

### Journal Papers (conditionally accepted)

1. Jared Miller and Mario Sznaiier. Bounding the Distance to Unsafe Sets with Convex Optimization, 2021. [link] (Conditionally Accepted by IEEE Transactions on Automatic Control in 2022)

### Journal Papers (submitted)

1. Jian Zheng, Tianyu Dai, Jared Miller, and Mario Sznaiier. Robust Data-Driven Safe Control using Density Functions, 2022. [link]

### Conference Proceedings (published)

1. Jared Miller and Mario Sznaiier. Bounding the Distance of Closest Approach to Unsafe Sets with Occupation Measures. In *2022 61st IEEE Conference on Decision and Control (CDC)*, pages 5008–5013, 2022. [link]
2. Jared Miller, Tianyu Dai, and Mario Sznaiier. Data-Driven Superstabilizing Control of Error-in-Variables Discrete-Time Linear Systems. In *2022 61st IEEE Conference on Decision and Control (CDC)*, pages 4924–4929, 2022. [link] (Outstanding Student Paper Award)
3. Filip Bečanović, Jared Miller, Vincent Bonnet, Kosta Jovanović, and Samer Mohammed. Assessing the Quality of a Set of Basis Functions for Inverse Optimal Control via Projection onto Global Minimizers. In *2022 IEEE 61st Conference on Decision and Control (CDC)*, pages 7598–7605, 2022. [link]
4. Jared Miller and Mario Sznaiier. Facial Input Decompositions for Robust Peak Estimation under Polyhedral Uncertainty. *IFAC-PapersOnLine*, 55(25):55–60, 2022. [link] (Young Author Award)
5. Jared Miller, Didier Henrion, Mario Sznaiier, and Milan Korda. Peak Estimation for Uncertain and Switched Systems. In *2021 60th IEEE Conference on Decision and Control (CDC)*, pages 3222–3228, 2021. [link] (Outstanding Student Paper Award)
6. J. Miller, R. Singh, and M. Sznaiier. MIMO System Identification by Randomized Active-Set Methods. In *2020 59th IEEE Conference on Decision and Control (CDC)*, pages 2246–2251, 2020. [link]
7. Jared Miller, Yang Zheng, Mario Sznaiier, and Antonis Papachristodoulou. Decomposed Structured Subsets for Semidefinite Optimization. In *2020 21st IFAC World Congress*, 2020. [link]
8. Chieh Wu, Jared Miller, Yale Chang, Mario Sznaiier, and Jennifer Dy. Solving Interpretable Kernel Dimensionality Reduction. In H. Wallach, H. Larochelle, A. Beygelzimer, F. d'Alché-Buc, E. Fox, and R. Garnett, editors, *Advances in Neural Information Processing Systems*, volume 32, pages 7915–7925. Curran Associates, Inc., 2019. [link] (acceptance rate 21.9%)
9. J. Miller, Y. Zheng, B. Roig-Solvas, M. Sznaiier, and A. Papachristodoulou. Chordal Decomposition in Rank Minimized Semidefinite Programs with Applications to Subspace Clustering. In *2019 IEEE 58th Conference on Decision and Control (CDC)*, pages 4916–4921, 2019. [link]

### Conference Proceedings (published)

10. J. Miller and B. Shafai. A Model of Heave Dynamics for Bagged Air Cushioned Vehicles. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 976–981, 2019. [link]
11. B. Taskazan, J. Miller, U. Inyang-Udoh, O. Camps, and M. Sznaier. Domain Adaptation Based Fault Detection in Label Imbalanced Cyberphysical Systems. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 142–147, 2019. [link]

### Conference Proceedings (accepted but not yet published)

1. Jared Miller, Tianyu Dai, and Mario Sznaier. Superstabilizing Control of Discrete-Time ARX Models under Error in Variables. In *2023 22nd IFAC World Congress*, 2023. [link]

### Conference Proceedings (submitted)

1. Jared Miller, Tianyu Dai, Mario Sznaier, and Bahram Shafai. Data-Driven Control of Positive Linear Systems using Linear Programming, 2023
2. Jared Miller, Milan Korda, Victor Magron, and Mario Sznaier. Peak Estimation of Time Delay Systems using Occupation Measures, 2023
3. Tooba Imtiaz, Morgan Kohler, Jared Miller, Zifeng Wang, Mario Sznaier, Octavia Camps, and Jennifer Dy. SAIF: Sparse Adversarial and Interpretable Attack Framework, 2022. [link]

### Preprints

1. Jared Miller, Tianyu Dai, and Mario Sznaier. Data-Driven Stabilizing and Robust Control of Discrete-Time Linear Systems with Error in Variables, 2022. [link]
2. Jared Miller and Mario Sznaier. Facial Input Decompositions for Robust Peak and Reachable Set Estimation under Polyhedral Uncertainty, 2021. [link]

### Seminars

1. “Data-Driven Control under Input and Measurement Noise”, NYU MERIT Lab Seminar Series, New York City, Feb 21, 2023. [link]
2. “Bounding the Distance to Unsafe Sets with Convex Optimization”, DCSD Rising Stars, 2nd Modeling, Estimation and Control Conference, Jersey City, October 2-5 2022. [link]
3. Tutorials about Convexity, Interior Point Methods, Frank-Wolfe algorithms (with applications to system identification), and Polynomial Optimization, June 27, 2022, From Data to Control, Israeli Association of Automatic Control (with M. Sznaier). [link]
4. “Bounding distances to unsafe sets”, June 16, 2022, IfA Coffee Talks, ETH Zurich. [link]
5. “Bounding distances to unsafe sets”, June 14, 2022, LA3 Meeting, EPFL Lausanne. [link]
6. “Bounding distances to unsafe sets”, June 3, 2022, Journées SMAI MODE, University of Limoges (XLIM). [link]
7. Tutorials about Interior Point Methods, Polynomial Optimization, Frank-Wolfe algorithms and variations, and SDP approximations, May 16-20, Sparsity and Big Data in Control, Systems Identification, and Machine Learning, European Embedded Control Institute.
8. “Bounding distances to unsafe sets”, April 14, 2022, Conic Linear Optimization for Computer-Assisted Proofs, Mathematisches Forschungsinstitut Oberwolfach (MFO). [link]
9. “Bounding distances to unsafe sets”, June 28, 2021, Brainstorming days on measure and polynomial optimization (BrainPOP), LAAS-CNRS. [link]
10. “Data-Driven Peak and Reachability Set Estimation”, May 25, 2021, MS112 Methods of Learning Dynamical Systems for Control, SIAM Conference on Dynamical Systems. [link]
11. “Analysis and Control of Time-Delay Systems with Occupation Measures”, May 3, 2021, BrainPOP, LAAS-CNRS. Work not yet published, in preparation. [link]
12. “Exploiting Structure in Rank-Constrained and Approximated Semidefinite Programs”, December 19, 2019, TISEM Operations Research Seminar, Tilburg University. [link]

### Seminars (upcoming)

1. “Nonlinear and Time-Delay Systems Analysis using Occupation Measures”, April 3, 2023, PhD Thesis Defense, Northeastern University.
2. “Data-Driven Control under Input and Measurement Noise”, April 9, 2023, Oden Institute Seminar, UT Austin [link].
3. “Analysis and Control of Time-Delay Systems Using Polynomial Optimization”, May 14, 2023, MS14 Studying Dynamics using Polynomial Optimization Tools, SIAM Conference on Dynamical Systems.

### Poster Sessions (without Conference Proceedings)

1. “Safety Analysis and Control using Measures.” February 27, 2023, PhD Research Expo, Northeastern University. [link]
2. “Diameter Constrained Minimum Spanning Graphs.” January 31, 2023, Current Themes of Discrete Optimization: Boot-camp for early-career researchers, ICERM. [link]
3. “Safety Analysis using Distance Estimation and Measures.” August 24, 2022. CLEVR-AI MURI Yearly Review Meeting, Northeastern University. [link]
4. “Exploiting SDP Structure Yields Tighter Approximations.” April 9, 2020. RISE, Northeastern University (remote). [link]
5. “Exploiting SDP Structure Yields Tighter Approximations.” February 24, 2020. IPAM Control, Learning and Optimization workshop, University of California, Los Angeles. [link]
6. “Chordal Decompositions in Rank Minimized SDPs.” May 30-31, 2019. Learning for Decision and Control (L4DC), Massachusetts Institute of Technology. [link]
7. “Chordal Decompositions in Rank Minimized SDPs.” May 10, 2019. New England Machine Learning Day, Northeastern University. [link]
8. “Scattered data interpolation through B-spline wavelets and the Elastic Net.” April 14, 2017. RISE, Northeastern University. [link]
9. “A parallelized Python-based Multi-Point Thomson Scattering analysis in NSTX-U.” October 29, 2014. 56th Annual APS Plasma Physics Conference, New Orleans. [link]

## Experience

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### Northeastern University

RESEARCH ASSISTANT, ROBUST SYSTEMS LAB, CONTROLS GROUP

*Boston, MA, USA*

*Jul. 2017 - Present*

### Laboratory for Analysis and Architecture of Systems (LAAS-CNRS)

CHATEAUBRIAND FELLOW, DECISION AND OPTIMIZATION, METHODS AND ALGORITHMS IN CONTROL (MAC) TEAM

*Toulouse, FR*

*Jan. 2022 - Jul. 2022*

### Paradigm Hyperloop

CONTROL THEORIST, LEVITATION GROUP

*Boston, MA, USA*

*Jul. 2017 - Dec. 2017*

### ASML Holding

CO-OP, METROLOGY GROUP

*Veldhoven, NL*

*Mar. 2016 - Aug. 2016*

### Advanced Micro Devices (AMD)

CO-OP, SHADER COMPILER GROUP

*Boxborough, MA, USA*

*Jan. 2015 - Jun. 2015*

### Princeton Plasma Physics Laboratory (PPPL)

INTERN/PART-TIME CONTRACTOR, DATA VISUALIZATION GROUP

*Plainsboro Township, NJ, USA*

*Sep. 2012 - Feb. 2016*

### Cornell High Energy Synchrotron Source (CHESS)

SUMMER INTERN/RESEARCH ASSISTANT

*Ithaca, NY, USA*

*Jul. 2012 - Aug. 2012*

## Teaching

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### Northeastern University

TEACHING ASSISTANT

- EECE 5644: Machine Learning and Pattern Recognition

*Boston, MA, USA*

*Fall 2022*

TEACHING ASSISTANT

- EECE 7345: Big Data, Sparsity, and Control

*Fall 2021*

### European Embedded Control Institute

TEACHING ASSISTANT

- Sparsity and Big Data in Control, Systems Identification and Machine Learning

*Toulouse, FR*

*May 16-20, 2022*

## Honors & Awards

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Jun. 2023 **Travel Award**, 2023 American Control Conference (ACC)

*San Diego, CA*

Jan. 2023 **Travel Award**, ICERM workshop: Current Themes of Discrete Optimization

*Providence, RI*

Dec. 2022 **Outstanding Student Paper Award**, 2022 61st IEEE Conference on Decision and Control

*Cancún, MX*

Dec. 2022 **Travel Award**, 2022 61st IEEE Conference on Decision and Control

*Cancún, MX*

Oct. 2022 **ASME DSCD Rising Star Award**, MECC 2022 (IFAC)

*Jersey City, NJ, USA*

Sep. 2022 **Young Author Award**, ROCOND 2022 (IFAC)

*Kyoto, JP (remote)*

Apr. 2022 **Travel Award**, MFO: Conic Linear Optimization for Computer-Assisted Proofs

*Oberwolfach, DE*

Jan. 2022 **Travel Award (for Toulouse)**, AFOSR FY22 International Student Exchange Program (ISEP)

*Arvada, CO, USA*

Dec. 2021 **Outstanding Student Paper Award**, 2021 60th Conference on Decision and Control

*Austin, TX, USA*

Apr. 2020 **Chateaubriand Fellowship**, Office of Science and Technology, Embassy of France in the USA

*Toulouse, FR*

Feb. 2020 **Hosting**, IPAM: Intersections between Control, Learning and Optimization (UCLA Workshop)

*LA, CA, USA*

Dec. 2019 **Travel Award for Seminar**, TISEM Seminar at Tilburg University

*Tilburg, NL*

Aug. 2019 **Travel Award**, 2019 IEEE Conference on Control Technology and Applications (CCTA)

*Hong Kong*

2013-2018 **Honors Program**, Northeastern University

*Boston, MA, USA*

2015-2018 **Dean's List**, Northeastern University

*Boston, MA, USA*

## Skills

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**Programming**   Matlab (incl. Simulink), Python, Mathematica, LaTeX, Julia, C/C++  
**MS Office**   Word, Excel, PowerPoint, Publisher

## Professional Organizations

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### Institute of Electrical and Electronics Engineers (IEEE)

(GRADUATE) STUDENT MEMBER

*Sept. 2013 - Present*

### IEEE Eta Kappa Nu (HKN)

MEMBER

*Sept. 2014 - Present*

### Society for Industrial and Applied Mathematics

MEMBER

*Oct. 2019 - Present*

### IEEE CSS Technical Committee on Robust and Complex Systems (TC-RoCS)

MEMBER

*Sept. 2022 - Present*

### IFAC Technical Committee 2.5 Robust Control

MEMBER

*Sept. 2022 - Present*

## Professional Service

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### Reviewer

Automatica, IEEE TAC, IEEE L-CSS, L4DC, ROCOND, CDC, Nonlinear Analysis: Hybrid Systems, Kybernetika